SOUTHERN AFRICAN NATIONAL HERBARIA

CHRISTOPHER K. WILLIS (Editor)

Status Reports 1996

Southern African Botanical Diversity Network Report

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No. 1

Southern African Botanical Diversity Network Report

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FOREWORD

Brian J Huntley
Chairman: SABONET Steering Committee

This report is the first of a new series of working documents that will emerge from the recently established Southern African Botanical Diversity Network (SABONET).

SABONET was established in response to the long-standing need recognised by botanists in the region for a professional network aimed primarily at building the capacity of plant scientists and botanical research in southern Africa. The concept was agreed to at an historic meeting in Maputo in February 1990, when workers from throughout the SADC region, including colleagues from South Africa, met for the first time. The Maputo meeting workshopped all aspects of needs and priorities for such a network, but unfortunately funding to implement the ideas did not come through.

Further planning workshops, in the broader context of biodiversity, were held in Malawi (1991), Zimbabwe in 1993 and in Namibia also in 1993.

Frustrated by the slow progress in raising funding for southern African botany, the National Botanical Institute convened a tightly focused conference on 'Conservation and Utilization of Southern African Botanical Diversity' at Kirstenbosch, Cape Town, in September 1993. The conference programme included 24 invited review papers on the 'state of the science' in the region and was followed by a workshop in which the 120 participants from 14 African countries identified, in great detail, the needs and priorities for capacity building and institutional strengthening in the region.

This needs assessment confirmed the emphasis given at the Maputo, Bulawayo, Gobabeb, Zomba and other meetings for in-service training and basic equipment, plus the establishment of a professional network, as the top priorities for southern Africa.

Following the Cape Town meeting, and the publication of the proceedings (Huntley 1994), a formal proposal was made to the Global Environment Facility (GEF) for funding support. The proposal was approved by the GEF Council in April 1996 and funds will be released for SABONET in 1997. Parallel to the GEF proposal, a funding proposal was made to USAID by the IUCN Regional Office for southern Africa, based in Harare, on the basis of the recommendations coming out of the Zimbabwe meeting of 1993. USAID approved the proposal in October 1995, immediately releasing funds to SABONET and other capacity building projects in the region.

Thus SABONET was born of wide-ranging consultation over many years, and is now a going concern, with activities including planning workshops, training courses, its own *SABONET News* and this new series of *SABONET Reports*.

This first report includes the proceedings of a planning workshop held in Pretoria in July 1996. The workshop was designed to further assess the status of herbaria in the region and to plan the curricula of the training courses to be offered by SABONET. The individual papers present the reports as they were told – often directly from the tape recorded presentations, which have been kept as an 'oral history' of the state of the science in 1996. As such they provide a unique baseline at the start of this major capacity building programme, against which progress and products can be measured in the coming years.

SABONET promises much for southern African botany, and for science in the region as a whole. It is one of the first truly 'south-south' approaches to addressing regional development needs. Its success or failure is thus entirely dependent on the goodwill and energy of all of 'us', rather than on a few of 'them'. I have no doubt that it will be a major victory.

ACKNOWLEDGEMENTS

Sincere thanks are extended to the following people for providing information on various South African herbaria: Estelle Brink (GRA), Carole de Wet (PRE), Hugh Glen (PRE), Pat Lorber (BOL), Ted Oliver (NBG), Yashica Singh (NH), Hannelie Snyman (PRE), Terry Trinder-Smith (BOL) and Rosemary Williams (NH), as well as Stephen Mavi for providing updated information on the number of specimens in SRGH. This publication was made possible through support provided by the GEF through the UNDP; and the Regional Centre for Southern Africa, Gaborone, Botswana, US Agency for International Development (Plot no. 14818 Lebatlane Road, Gaborone West, Extension 6, Gaborone), under the terms of Grant No. 690-0283-A-00-5950. The opinions expressed herein are those of the authors and do not necessarily reflect the views of either the US Agency for International Development, the World Conservation Union, or the GEF/UNDP.

LIST OF ACRONYMS

CITES	**Convention for International Trade in Endangered Species**
DOS	**Disk Operating System**
FAO	**Food and Agriculture Organization**
GEF	**Global Environment Facility**
GIS	**Geographical Information Systems**
GPS	**Global Positioning System**
IBPGR	**International Board for Plant Genetic Resources**
ICLARM	**International Centre for Living Aquatic Resources Management**
ICRAF	**International Council for Research in Agroforestry**
ICRISAT	**International Crops Research Institute for the Semi-Arid Tropics**
IUCN	**The World Conservation Union (International Union for the Conservation of Nature and Natural Resources)**
NGOs	**Non-Governmental Organizations**
NORAD	**Norwegian Agency for International Development**
PRECIS	**PREtoria Computerized Information System**
SABONET	**Southern African Botanical Diversity Network**
SADC	**Southern African Development Community**
UN	**United Nations**
UNCED	**United Nations Conference on Environment and Development**
UNDP	**United Nations Development Programme**
WWF-SA	**World Wide Fund for Nature - South Africa**

1. ANGOLAN HERBARIA

Ms Liz Matos
Faculdade de Ciencias, Universidade Agostinho Neto, CP 815, Luanda, Angola

1.1 INTRODUCTION

Although almost two years have passed since the Lusaka Peace Agreement, and there are no longer open hostilities between the Army and Unita, there is still no sure climate of peace nor free circulation of people and goods in many areas of the country. The peace process, overseen by 8 000 UN troops, continues to move at a snail's pace. Inflation stands at 3 000 % a year and the past five years have seen a persistent and increasing loss of the few national cadres in government service to international agencies, NGOs, the private sector, or abandoning the country.

This situation has had two major effects on Angola's herbaria (Table 1) and prospects for botanical conservation:

i. There were three herbarium collections in Angola, previously housed in Huambo, Luanda and Huila. Due to insecurity, resulting from post-1992 conflict and robberies, the largest and most important collection from Huambo was evacuated to Luanda in 1995, where it is now housed in the Luanda Herbarium building.

ii. In a climate of increasing competition for, and ever diminishing supply of, trained personnel, there is not one single trained taxonomic botanist in the country working in any herbarium.

TABLE 1. The state of plant collections in Angolan herbaria.

Herbarium Collection	Number of Registered Specimens	Existence of duplicates in respective herbaria*	Herbarium Site
HUAMBO			
Main Collection	40,000	Yes (number unknown)	Luanda
Gossweiler Collection			"
LUANDA			
Main Collection	32,000	Yes (number unknown)	Luanda
Lubango Duplicates	12,000	-	"
Biology Department Collection	8,000	No	"
LUBANGO	15,000	Yes (number unknown)	Lubango (Huila)

* Many specimens have known duplicates in Lisbon, Coimbra (Portugal) and other herbaria.

1.2 PERSONNEL, FACILITIES AND EQUIPMENT

1.2.1 *Personnel*

Luanda

The first Angolan trainee in the SABONET Project worked in the Herbarium in Luanda for less than two months before leaving the post without notice or warning to return to her previous post at the Fisheries Research Institute (in return for a package of new perks that are beyond the reach of the SABONET Project).

Her place has been taken by Ms Teresa Martins, 1995 biology graduate, who has been responsible for storing the Huambo Herbarium collection in Luanda. Teresa has had no previous training in herbarium work.

Dr Manuela Batalha, medicinal plants specialist, began part-time work at the Luanda Herbarium at the beginning of June, organising her writings on Angolan medicinal plants. There are two herbarium assistants, one of whom is a basic level technician who has been working there for more than 20 years.

Lubango

Mr Daniel, life-long herbarium technician and excellent medicinal plants specialist, is now employed as a botany teacher by the Education Institute's Biology department, and is to be supported by the SABONET Project to work in the Lubango Herbarium, alongside Mr Pereira, young botany teacher in the same department.

1.2.2 *Facilities*

There are three herbarium sites in Angola.

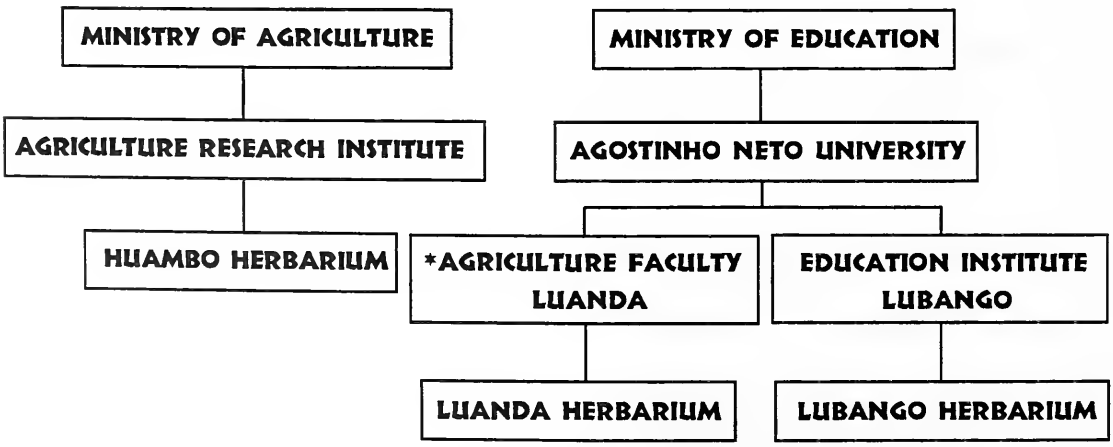
Huambo

The internationally recognised Huambo Herbarium was housed at the Agriculture Research Institute (IIA)(Figure 1) in Chianga, 13 km from the city of Huambo. The walls and roof of this excellent structure are intact, but all the doors and many windows require repairs. The herbarium cabinets are intact. Many invaluable volumes from the herbarium library were stolen in 1995 for sale in the market as notebooks or wrapping paper. Some of this material was recovered in the market, and is now held in Luanda for safe-keeping.

At the same time it was agreed between the Director of IIA, the Minister of Agriculture and Huambo Provincial Agriculture Representative, that the Huambo Herbarium should be evacuated to Luanda *pro tem*. All specimens (main collection, Gossweiler's collection and duplicates) were all transferred, together with all catalogues and essential literature. It was not possible to transport all the remaining books, and their present state is unknown.

Luanda

The Luanda Herbarium has been housed for over 25 years in an excellent, strong building, the former Angolan Scientific Research Institute (IICA). It comprises one large herbarium room and four smaller preparation rooms and offices. Due to Luanda's high relative humidity (average 80 %) the herbarium requires air-conditioning. The original central air-conditioning system is no longer functioning but, thanks to a generous donation from De Beers and WWF-SA, four heavy-duty window-type conditioners were installed in the main room at the beginning of 1996 for the conservation of both Luanda and Huambo collections. The walls and ceilings have been painted, but other repairs have been held up due to lack of funds. The Luanda collection is housed in its original cabinets, although these are insufficient for all the specimens in the herbarium. The Huambo collection is stored in cardboard boxes on temporary shelving and above the herbarium cabinets.



* The Agriculture Faculty will probably move out of its Luanda premises shortly and Biology Department of the Science Faculty may then take over responsibility for the Herbarium.

FIGURE 1. Organizational Charts for the Angolan herbaria.

Lubango (*Huila*)

The Lubango Herbarium is housed in good conditions in the Education Institute building in Lubango (Figure 1). It is in good climatic conditions, with low relative humidity and relatively cool temperatures. The herbarium cabinets are in good condition and there are Institute staff to ensure basic security of the collection.

1.2.3 *Equipment*

There is a shortage of all consumable equipment, including herbarium covers, flimsies and presses.

Two computers are required for Luanda, one to begin the organised inventory of the Luanda and Huambo collections and a personal computer for Dr Manuela Batalha to begin organising her extensive work on medicinal plants.

A deep freezer is required for Luanda.

1.3 TRAINING

Ms Teresa Martins (and assistant Ms Virginia) needs to be trained in herbarium management techniques and particularly in appropriate data entry to a standardised system.

Ms Martins requires training in English and basic computer skills, to be followed by specialised courses mentioned above.

1.4 WORK PLAN

- Complete the rehabilitation of the Luanda Herbarium.
- Inventory all herbaria to species level, using a system that is compatible with the rest of the region.
- Train Ms Teresa Martins (and assistant and Mr Pereira) in the appropriate methods.

2. HERBARIA IN BOTSWANA

Dr Than Than Aye
Curator, University of Botswana Herbarium, University of Botswana, Private Bag X0022, Gaborone 0267, Botswana

Botswana has four herbaria, two of which are administered by the University of Botswana. The National Herbarium and Sebele Agriculture Herbarium are under the Ministry of Labour and Home Affairs and Ministry of Agriculture respectively. The common objective of all the herbaria is to collect, preserve and maintain the collections.

2.1 UNIVERSITY OF BOTSWANA HERBARIUM (UCBG)

The University of Botswana Herbarium is a teaching and research facility of the University and located in the Department of Biological Sciences (Figure 2). The herbarium was established in 1978 by Dr P J Mott as part of the University of Botswana, Lesotho and Swaziland. In 1980, it became the University of Botswana Herbarium. The main objectives of the herbarium are to:

- serve as a reference collection of plants in the country
- train students in plant collection, preservation and herbarium techniques
- provide services in plant identification and information not only to the university community but also to the general public.

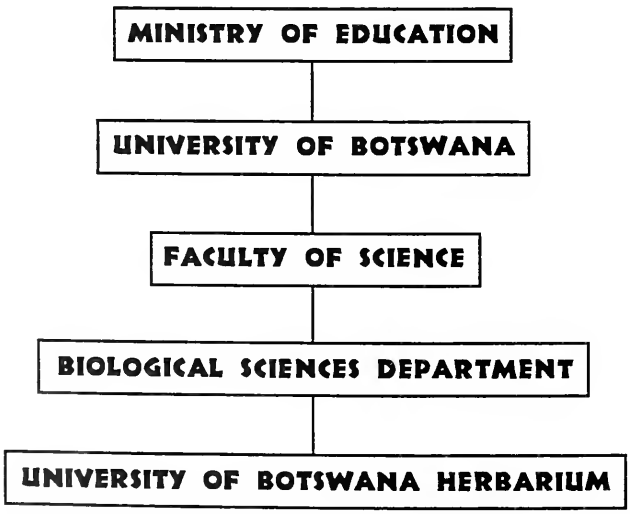


FIGURE 2. Organizational Chart for the University of Botswana Herbarium, Gaborone.

The herbarium was previously housed in a small building (Block 205) but moved to the present location in 1994. The herbarium consists of:

- a spacious temperature-controlled room
- an adjacent room for storing equipment
- a preparation room for mounting.

The herbarium has filing cabinets, storage cabinets, a freezer, microwave and microscopes. The herbarium does not have adequate books, journals and floras as the department cannot get the budget for the herbarium library.

Currently, the University does not have permanent posts for the herbarium. There is an acute shortage of staff in the herbarium as the curator and the supporting staff are full-time staff members of the Department of Biological Sciences. They have been assigned to the herbarium in addition to their normal duties and responsibilities.

Traditionally, a botanist/plant taxonomist is in charge of the herbarium as the curator, and a botany technician/assistant technician to assist the curator. As in the case of some university herbaria, the main responsibility of the curator is teaching and research, and as such, curating and other related activities are usually done during the long vacation. Nevertheless, the curator and the support staff avail themselves when there is a need for immediate attention in the herbarium.

The development of the herbarium has been hampered due to lack of full-time staff. The support staff also need training.

During the academic year 1995-1996 the herbarium was fortunate enough to have two volunteers to alleviate the work load. The Head of the Department has recently requested the Administration to create a full-time curator position.

The herbarium has a collection of about 10 000 mounted specimens mainly from Botswana and a few from the neighbouring countries. Certain areas of the country are not represented in the collection.

Due to time constraints the herbarium has a backlog of specimens for identification and mounting. All specimens have typed labels. A card catalogue is also maintained for the collection. The collections are not yet computerised as there are no computers in the herbarium. All this indicates that human and financial resources are needed to fully develop the herbarium.

At present there are two on-going research projects undertaken by the curator (Dr T.T. Aye).

- Flowering plants of Botswana – no funding available
- Useful plants of Botswana – funded by the University

In spite of the difficulties such as shortages of staff, the herbarium is open to the public to assist in plant identification/information services. A brochure is produced to promote the awareness of the existence of the herbarium and also to assist those who need information on Botswana plants.

2.2 NATIONAL HERBARIUM (GAB)

The National Herbarium is part of the establishment of the National Museum, Monuments and Art Gallery of the Ministry of Labour and Home Affairs (Figure 3).

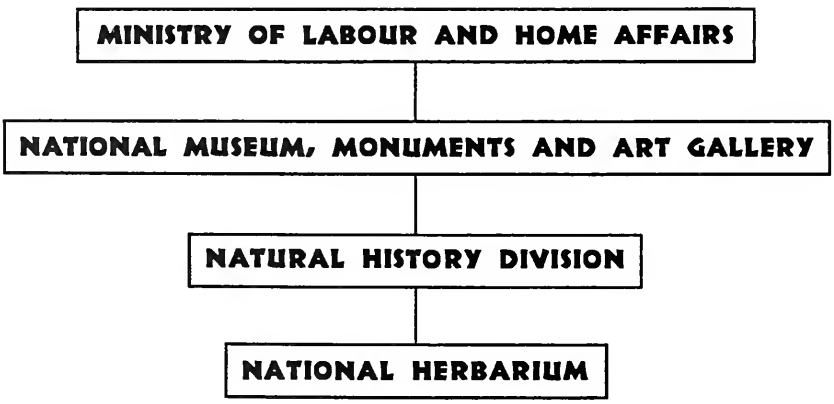


FIGURE 3. Organizational Chart for Botswana's National Herbarium, Gaborone.

The herbarium is a small building opposite the Gaborone Club. The building consists of a room with six filing cabinets and two smaller rooms for storage. The rooms are not air conditioned with very limited working space available.

Plans are underway to build a two-storey building for the Natural History Division that will provide more space for the herbarium to accommodate the increasing specimens.

The herbarium has a computer, freezer, microscope and a small collection of books. The main library is, however, in town, about 6 km from the herbarium.

The establishment is as follows:–

- 1 Curator – vacant
- 1 Assistant Curator
- 1 Herbarium Assistant

Curator position is soon to be appointed and assistant curator has recently returned from study leave. The herbarium needs training for the technical staff. There are about 10 000 – 12 000 mounted specimens arranged in an alphabetical system. Due to the shortage of staff the herbarium is open to the public by appointment only.

2.3 PETER SMITH HERBARIUM (PSUB)

In 1993, the University of Botswana Senate and Council instituted the Okavango Research Centre based on the development of the existing Maun Field Station. The objective of the Okavango Research Centre is to develop and support research of the University staff and students in the region.

The herbarium (Figure 4) was established in 1995 based on the collections of pressed specimens of about 5 000 donated by Mr Peter Smith. The collections are mainly from the Okavango Delta and some from other regions of the country.

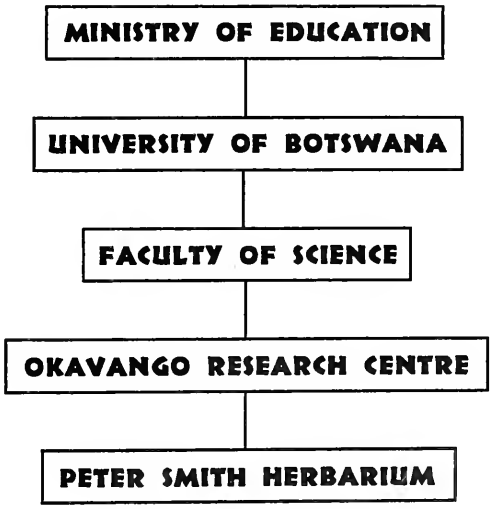


FIGURE 4. Organizational Chart for the Peter Smith Herbarium, Maun, Botswana.

With the financial assistance from the UNDP, the mounting of the specimens is in progress. Mr Smith monitors the project and a student development fellow supervises the technical assistance of the two volunteers. The student development fellow needs herbarium training.

The collections are presently in a prefabricated building. The herbarium has six steel cabinets for filing, microscopes and a computer.

2.4 SEBELE AGRICULTURAL HERBARIUM (MAH)

The Sebele Agricultural Herbarium is a teaching and research facility of the Botswana Agricultural College situated in Sebele about 9 km from Gaborone.

The herbarium has a collection of about 2 000 mounted specimens in wooden filing cabinets. The collections are not computerised.

The curator and staff are range ecologists, and are mainly responsible for teaching and research at the College.

3. THE STATUS OF THE ROMA HERBARIUM (ROML), LESOTHO

Ms Annah Moteetee
Biology Department, National University of Lesotho, P.O. Roma 180, Lesotho

Plant collection in Lesotho started during the last century. The first collector was Thomas Cooper whose name is remembered in a number of species such as *Pentzia cooperi*. Other early collectors include three amateur botanists by the names of H.J. Thode, H.G. Flanagan, and E.E. Galpin, who are remembered in plant names such as *Alepedi thodei*, *Selago flanaganii* and *Crassula galpinii* respectively. These specimens have been deposited in various herbaria in Europe (e.g. Kew and Zurich) and South Africa (Grahamstown and Pretoria).

The Roma herbarium (ROML) was started by Amy Jacot Guillarmod who was one of the first lecturers in Botany at the then Pius XII College. It is housed in the Biology Department at the National University of Lesotho (Figure 5). Although mention is made about the existence of three herbaria in the country, the Roma Herbarium is the largest and the only relatively active one. As long ago as 1977, it was proposed that all the three herbaria in the country be co-ordinated as units of the National Herbarium, but nothing has been done. A National Herbarium is an urgent priority to study the plant diversity in Lesotho. Furthermore, there is a high risk of losing valuable indigenous plant resources due to forest clearance, collection of firewood and medicinal plants. The suggestion of a National Botanical Garden has also been made, but to this day the small teaching garden at the University remains Lesotho's only botanical garden.

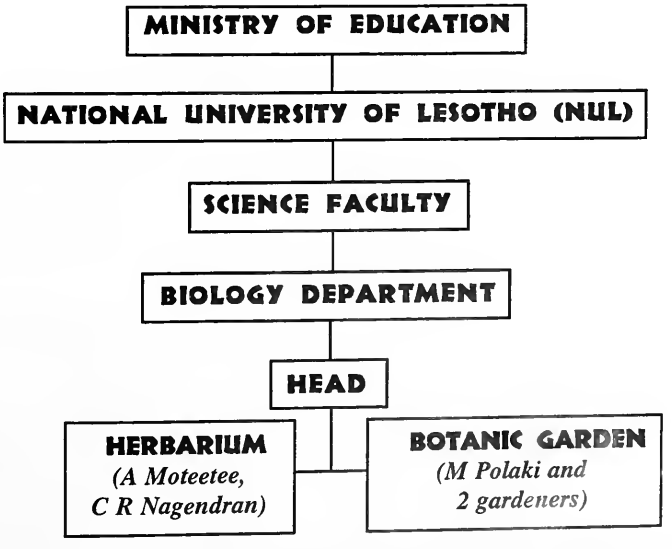


FIGURE 5. Organizational Chart for the herbarium at the National University of Lesotho, Roma, Lesotho.

The Roma herbarium has about 16 000 specimens. The specimens have been collected by A.J. Guillarmod and other botanists including D.J.B. Killick, O.M. Hilliard, B.L. Burtt, F. Hoener and A. Beverley (the last two were Peace Corps Volunteers who collected mainly in the high mountains). The largest collection is that of M.O. Schmitz-Ruch who has written the only illustrated book on Lesotho flora called "Wild Flowers of Lesotho". However, there is a very large collection which is in urgent need of determination by experts in herbaria of international repute. There is also a need for more plant collection. Even when collections have been made, it is difficult to identify the different taxa. The only comprehensive work on Lesotho's flora is Guillarmod's "Flora of Lesotho" (1971), but one cannot use this book because there is no key.

Staff members in the department of Biology, on a voluntary basis, have tried to take care of these precious specimens since there are no permanent staff to maintain the herbarium. Currently there are only two plant taxonomists in the department and it is almost impossible to keep the herbarium up-to-date regularly. For recurring expenses, there is no allocation of funds, the herbarium is maintained with the department funds. There are very few time-honoured wooden cabinets, and proper herbarium cabinets of welded steel are required. As the space is limited, the herbarium cannot expand and cater to national needs. The Biology department is in the process of introducing post-graduate programmes and in order to have strong Botany-based projects a well-equipped herbarium, in terms of personnel, equipment and enough funding is a necessity. The Biology department would also like to have a small library attached to the herbarium, but according to the University library policies, departments are not allowed to keep libraries. There is only one main library and the book collection does not meet the herbarium needs.

The herbarium is mainly a teaching one, and research has been limited because of the financial constraints faced by the University. The scope of research is very wide as very little work has been done on the Lesotho flora. Once the post-graduate programmes are in place, more research work should be possible. The filing system is entirely alphabetical by family, genus and species. The herbarium contains a small collection of algae, some bryophytes (most of which have been collected by J.G. Duckett), and some pteridophytes including about 16 families of ferns (the Adiantaceae having the largest number of genera). There are also a few specimens of gymnosperms, most of the specimens being exotic.

The largest collection is that of angiosperms, with about 25 monocotyledon families and about 116 dicotyledon families. Among the monocotyledons, the Poaceae is the largest, having over 100 genera, followed by the Liliaceae, with over 30 genera, the Cyperaceae, the Orchidaceae and the Iridaceae. Among dicotyledons the Asteraceae is the largest, with other relatively large dicotyledon families represented being the Scrophulariaceae, Rubiaceae and the Lamiaceae. Other families such as the Rutaceae and Proteaceae have no specimens collected within the country, but records indicate that these families are represented in Lesotho by at least one species. This observation emphasizes the urgent need for further work in this regard.

4. NATIONAL HERBARIUM AND BOTANIC GARDENS OF MALAWI

Mr Zacharia Magombo
National Herbarium and Botanic Gardens of Malawi, P.O. Box 528, Zomba, Malawi

4.1 INTRODUCTION

The National Herbarium and Botanic Gardens of Malawi is a botanical institution responsible for the study of plant diversity in terms of classification, conservation, distribution, ecology and sustainable utilisation. It has two major components namely the herbarium and the botanic gardens. A herbarium is a collection of preserved, dried plant specimens whereas a botanic garden is a collection of living plants. Both the herbarium and the botanic gardens serve scientific, conservational, educational, aesthetic, recreational, economic and environmental purposes. They are important reference purpose resources.

The history of herbaria in Malawi dates back to 1930 when the first herbarium was established by the Agriculture Department, Division of Plant Pathology, Zomba. It was later transferred to Chitedze Agricultural Research Station, Lilongwe. In 1956 the Forestry Department established a second herbarium in Zomba, but later was transferred to Chongoni Silvicultural Research Station, Lilongwe. The Agricultural Herbarium was set up with the primary aim of correctly naming hosts of certain fungi, while the Forestry Herbarium served as a reference collection to answer silvicultural problems. In 1966 a University Herbarium was established and attached to the Biology Department at Chancellor College. It acted as a teaching and research herbarium for the Biology Department, providing materials for botany classes and offering courses in Plant Systematics as well as identifying staff research material. Many institutions outside the University were also served by the University Herbarium.

The first Botanic Garden was established in Zomba by Alexander Whyte, Government Botanist in Sir Harry Johnston's administration between 1891 and 1895. The garden offered recreational services and was used as an experimental trial area for many newly introduced economic plants that were brought in from various parts of the British Empire. The maintenance of the garden was entrusted to the Forestry Department after Malawi's Independence in 1964.

During the 1970's the Government and the University of Malawi proposed the establishment of a national botanical institution for Malawi. These discussions led to the separation of the University Herbarium from the University and formed the nucleus for the proposed botanical institution. In 1987, the National Herbarium and Botanic Gardens of Malawi (NHBG) was established by an Act of Parliament No.7. In 1988 the Zomba Botanic Garden was entrusted

to the NHBG from the Forestry Department. The institution has its headquarters in the Municipality of Zomba and has regional offices in Lilongwe and Mzuzu.

The technical ministry for the NHBG is the Ministry of Natural Resources (Figure 6). As a parastatal, the NHBG is administratively under the Department of Statutory Corporations which falls under the Office of President and Cabinet (OPC). The NHBG has a number of institutions/departments with which it collaborates, namely the Department of Forestry, Parks and Wildlife and the University of Malawi.

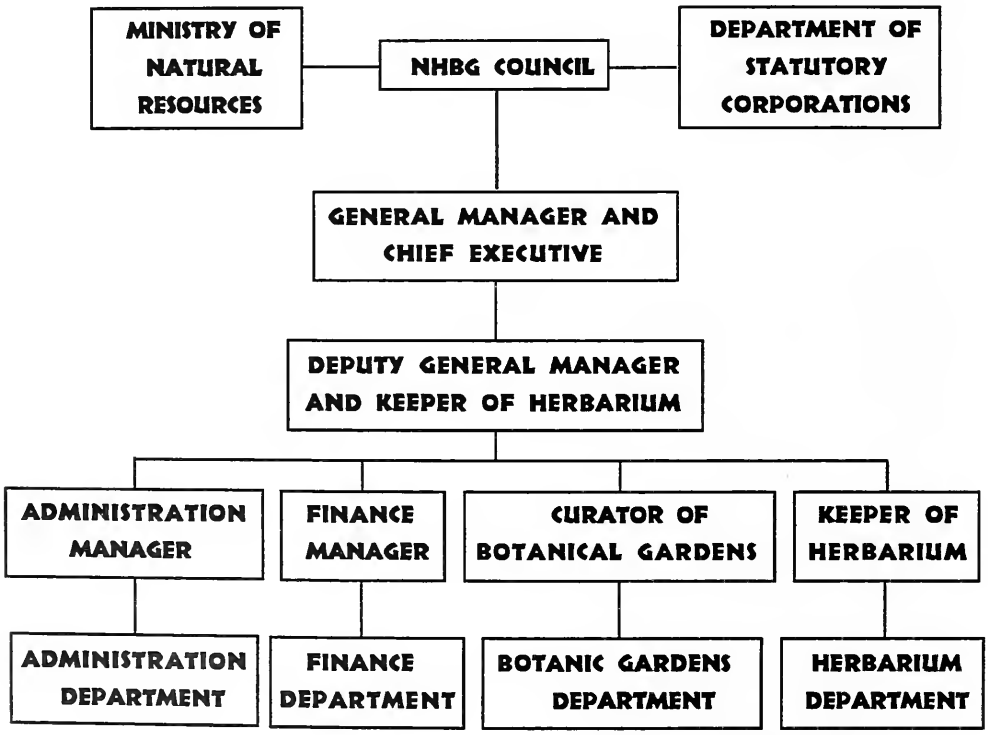


FIGURE 6. Organizational Chart for the National Herbarium and Botanic Gardens of Malawi.

4.2 MISSION STATEMENT

Develop and maintain herbaria, botanic gardens and arboreta in Malawi; study the flora and the vegetation of Malawi in terms of classification, conservation and sustainable utilisation; and offer academic training and research in plant sciences.

4.3 FUNCTIONS OF THE NHBG

The NHBG, as the principal authority on botanical and related fields in Malawi, has the following objectives:

a. To create a national centre for the assemblage, growth, curation and classification of a comprehensive collection of all the plants of Malawi;
b. To provide a plant identification service for the public, private and parastatal sectors; schools, colleges, university research workers, herbalists and the general public, and to answer questions concerning distribution and use of the flora and vegetation of Malawi.
c. To develop the National Botanic Gardens of Malawi with a principal garden in Zomba, and to help establish similar gardens in the three regions of Malawi, each site serving or comprising:

- ❖ a systematic collection of the representatives of the major plant families, and the vegetation types of Malawi, including indigenous and exotic plants of both economic and medicinal values,
- ❖ as conservation areas of the threatened, endangered, endemic indigenous plant species of Malawi,
- ❖ as an educational facility for use by schools, colleges, university and the general public,
- ❖ as testing grounds for introduced botanical materials in collaboration with other appropriate institutions,
- ❖ to promote a greater knowledge and expertise in horticulture,
- ❖ as a place of public amenity.

d. To serve as a national centre for the provision of loans exchange or donations of plant specimens and related botanical materials for documentation and research within and outside Malawi;
e. To carry out research on the flora and vegetation of Malawi and ensure that the results are published;
f. To act as a focus for the national conservation of the vegetation and constituent species of the flora of Malawi;
g. To participate in, and contribute to, the work of relevant national and international botanical/scientific organisations;
h. To provide advice, instruction and education on the plants and vegetation of Malawi to institutions and the general public.

Since its establishment the institution has three National Botanic Gardens namely Mzuzu Botanic Garden (Northern Region), Lilongwe Botanic Garden (Central Region) and Zomba Botanic Garden (Southern Region of Malawi).

The herbarium has a collection of about 80 000 specimens which are arranged alphabetically. The dicotyledon specimens constitute 60 % of this collection while the others constitute, *Monocotyledons* (35 %) and *Cryptogams* (5 %). Some parts of the country have been under collected and there is, therefore, need for more botanical explorations, especially in the Northern Region of the country. Both herbarium and botanic garden data have not yet been computerised.

4.4 CURRENT PROGRAMMES

The NHBG is currently involved in the following programmes:

- General field collection and identification of plant resources throughout the country including plant resource distribution;
- Studies on conservation of Malawi flora especially protected areas;
- Ethnobotanical research;
  Malawi Medicinal Plants and Biodiversity - International Development Research Centre (IDRC);
- Catalytic effect of plantation on rehabilitation of degraded tropical lands – sponsored by Oxford University and jointly executed by NHBG and Forestry Research Institute of Malawi (FRIM);
- Taxonomy and ecology of some species of *Brachystegia*;
- Taxonomy of *Panicum* spp. in Malawi – NHBG;
- *Brachystegia* woodland survey – ecological.

4.5 NHBG SERVICES

The institution offers a wide range of services including plant species identification, teaching and advisory services to the Government, statutory bodies, private corporations, international organisations and the general public.

4.5.1 *Government*

There are several Government Departments that deal in part or full with indigenous plants of Malawi. The main departments include Agricultural Research, Health, Forestry, National Parks and Wildlife, Fisheries, Veterinary, Land Husbandry, Education, Judicial and Water amongst others. Based on data from floristic analysis and vegetation surveys, the NHBG has proved valuable for strategic planning and management of development projects, proper utilisation, conservation and management of plant resources. This has also assisted the Government in integrating socio-economic development with environmentally sound management policies. The NHBG provides advice on the methods of collecting and preservation of plant specimens and also offers informal training in herbarium management and techniques.

4.5.2 *Educational Institutions*

The NHBG is a valuable resource to many educational establishments in Malawi, especially in teaching and research. In the University of Malawi, for example, the NHBG serves the departments of Biology, Chemistry, Geography and Earth Sciences, Crop Production and Animal Sciences in the identification of plant materials for research or teaching both for staff and students. The NHBG staff has also been involved in supervision of students at high levels of education especially MSc and PhD in plant science research work. Similar services for identification and provision of plant materials for teaching and research purposes are extended to secondary school teachers of biology, geography or wildlife clubs in secondary and primary schools.

4.5.3 *Private Corporations and Parastatals*

There are many private corporations and parastatals that consult the NHBG for plant determination of certain economic plants or related taxonomic queries. Some private corporations and parastatals have asked the NHBG to carry out Environmental Impact Assessments for new projects or vulnerable ecosystems. These services assist in the development of proper land use management systems and proper utilisation of biological resources.

4.5.4 *The General Public*

Members of the public, amateur botanists, farmers, estate owners, herbalists and many others interested in plants make use of the services offered by the NHBG. They send plant collections for determination or request other information about the plants for various purposes such as aesthetic and economic values. These include orchids, flowers, mushrooms, wild fruits, weeds, medicinal plants, poisonous plants and soil improvement plants. The NHBG cooperates with Traditional Healers/Herbalists or Traditional Birth Attendants and gives them advice on distribution, uses or other aspects of particular medicinal plants. As part of its education programme to the general public, the National Herbarium gives public lectures on various aspects of the flora and vegetation to schools, societies and meetings. It also displays its work at conferences, meetings and related gatherings. The living plants in the botanic gardens offer many examples of plant diversity and *ex-situ* conservation of Malawi's germplasm. The botanic gardens also offer aesthetic and recreational services. They have pleasant sites where the public enjoy themselves and there are many spots that are attractive to tourists, especially the Zomba Garden which is slightly developed. The general public has an opportunity to see and appreciate the beauty of nature and the importance of maintaining good environment by visiting the botanic gardens.

4.5.5 *International Organisations*

The NHBG is responsible for answering requests from various international botanical institutions and scientists around the world concerning the flora and vegetation of Malawi and the *Flora Zambesiaca* Region (Botswana, Malawi, Mozambique, Zambia and Zimbabwe). The requests may require information about certain plant groups in Malawi, including distributional, taxonomic, conservational or economic value data. Reciprocally, Malawi gets similar services from its cooperating botanical institutions such as Kew Gardens, Pretoria, Harare, Missouri, New York and Brussels Herbaria. At home the National Herbarium serves the botanical needs of a number of international bodies such as ICRAF, FAO, IBPGR, ICRISAT and ICLARM.

4.6 LINKS WITH OTHER INSTITUTIONS

The National Herbarium and Botanic Gardens of Malawi endeavours to fulfil its mandate as the national centre for botanical research, conservation and environmental facility by putting in place appropriate and strategic plans and policies. One way in which this has been achieved is by developing effective programmes of collaborative research and training with the full benefit of international institutions. The major one of these programmes is the official link between the Royal Botanic Gardens, Kew (UK) and NHBG. Through these collaborative programmes NHBG has increased its capacity to give or exchange scientific and technological information as appropriate for the collaborative programmes. It has also been possible for NHBG to seek opportunities for research and training appropriate to staff needs and career development. There are many other botanical institutions with which NHBG works collaboratively such as Missouri Botanic Garden (USA), National Botanical Institute, Pretoria (SA), Botanic Garden Conservation International (BGCI), and other botanic gardens and herbaria in the world. NHBG collaborates not only with botanical institutions but also many others involved in various disciplines – conservation, environment, socio-economic development – such as WWF, IUCN, and several UN conservation and environmental conventions, such as Wetlands, CITES, Biodiversity, Migratory Species, Climate Change and Desertification.

4.7 CONSTRAINTS/PROBLEMS

4.7.1 *Buildings*

The present offices at NHBG Headquarters in Zomba belong to the University of Malawi. The NHBG does not own any building at present. With the present university buildings at Zomba, there is limited space. This is true for all sections – the herbarium with well over 80 000 specimens has very limited space and as the collections build up specimens might easily be damaged; the library is very small, there is not enough space for shelves and the reference collection itself is also very small; the administration and accounts departments are equally uncomfortably housed. In

addition there are no staff houses nor proper offices at the two regional botanic garden sites in Lilongwe and Mzuzu. Lack of proper infrastructural development at all levels makes it difficult for the institution to carry out its activities in order to accordingly achieve its objectives. In this regard there is an urgent need for proper infrastructural development.

4.7.2 *Research Facilities and Other Equipment*

At present the institution has very few research facilities and the little that it has belongs to the University of Malawi. The National Herbarium does not have microscopes of its own, no chemicals and major laboratory facilities that would enable it to carry out cytological, systematic, conservation, economic botanical research and other activities to the required standards. The institution also does not have enough field equipment which would enable it to effectively carry out floristic and vegetation studies, environmental impact assessment work, biological resource conservation and utilisation research. The present status of research facilities and other equipment is far below the required basic level. This has been one of the major limiting factors for the institution to effectively meet its objectives.

4.7.3 *Library*

The institution has a small library with about 800 volumes accessioned and 300 periodicals. Some key reference materials such as *Index Muscorum* are missing. This situation hampers the capability of members of staff to carry out research.

4.7.4 *Human Resources Development*

As a scientific institution, the NHBG requires members of staff to be of a high calibre, highly skilled and qualified. This can be achieved by training its staff both locally and internationally. There is a need for an effective human resource development programme that includes training at all levels. In this regard lack of financial resources to enable training of NHBG staff has been the major limiting factor. Since its establishment, the NHBG has endeavoured to train its members of staff by offering in-service training and sending staff abroad to various appropriate institutions, especially in the UK. Considering the importance of the institution in the socio-economic development of the country, on both the short- and long-term basis, the present staffing levels are inadequate. Only a few members of staff have had the opportunity to upgrade their academic and professional qualifications. To date the institution has the following levels of staffing:

- Herbarium: 9 Scientific staff (1 PhD, 3 MSc, 5 BSc), 6 Herbarium Technicians (with Malawi School Leaving Certificate – or O-Level Equivalent) and 2 Herbarium Attendants

- ❖ Botanic Garden: 1 Curator, 4 Assistant Curators, 4 Foremen, 9 Garden Assistants and about 100 Temporary Staff.

The future of the institution (including the nation) depends on how effectively and professionally its members discharge their duties. This calls for urgent training of both technical and professional staff.

4.8 CONCLUSION

Considering the present status of the NHBG with respect to infrastructure, personnel and research facilities, the SABONET project comes at a time when the institution is in most need of support. There is a need for the training of staff, both technical and professional. The library needs to be expanded and more reference materials acquired. There is also a need to acquire some basic research facilities such as microscopes and field equipment to enable staff to carry out research. We are hopeful that SABONET shall be instrumental in meeting these needs.

5. THE MOZAMBIQUE NATIONAL HERBARIUM (LMA)

Mr Calane da Silva
Curator, LMA Herbarium, National Institute of Agronomic Research, CP 3658, Maputo, Mozambique

5.1 BACKGROUND

The Mozambique National Herbarium (LMA) is attached to the Botany Department of the National Institute of Agriculture Research (INIA) in Maputo (Figure 7). The LMA is a repository of reference specimens of plant material in Mozambique and it keeps representative and adequately named collections of the country's flora to assist in identification and naming of plant material collected by different institutions (e.g. the Ministry of Agriculture and the Ministry of Health) as well as the general public. This Herbarium carries out botanical surveys and inventories for national parks and reserves. It also keeps records of all known information on the distribution of various species in the country.

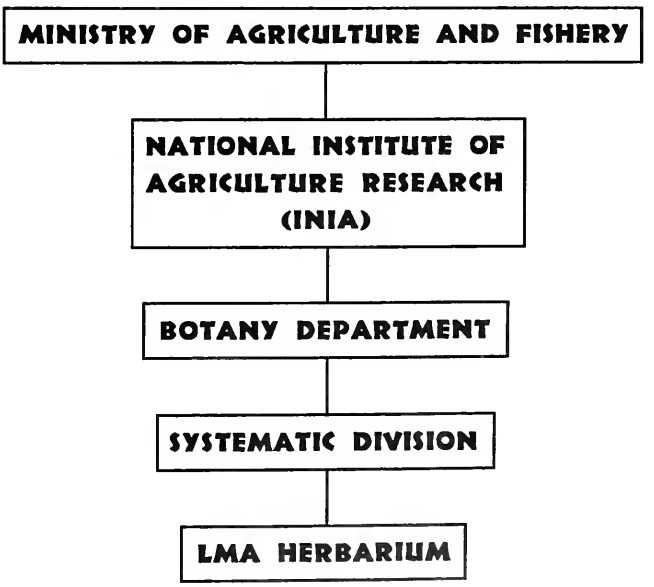


FIGURE 7. Organizational Chart for the LMA Herbarium, Maputo, Mozambique.

Considering the rapid changes in land use it is important to strengthen the herbarium at INIA to improve the knowledge of the flora, especially of actually or potentially useful plants, through inventories of insufficiently known areas, particularly when these are threatened by exploitation.

The strengthening of herbarium activities is of crucial importance for successful implementation of conservation activities and sustainable development stated in the Convention on Biological Diversity signed at UNCED in 1992. The herbarium plays a major role in undertaking taxonomic studies, assessing the biological diversity and conservation status of plants as well as documenting information about the Flora of Mozambique.

5.2 EXISTING INFRASTRUCTURE

5.2.1 *Building*

The building was built in 1965, and is large enough to house the LMA Herbarium and a laboratory and a corridor as a complementary part of the herbarium, which contains dried plants and a seed collection. The library is not being updated, which means there is a need for books, newsletters and other sources of information. Another need is to improve facilities for herbarium management and botanical research in Mozambique.

5.2.2 *Facilities*

Needs:

- Computers
- Vehicles
- Deep freezers
- Binocular Stereo Microscope
- Dehumidifier
- Updating Literature

Note:
In Mozambique there is another herbarium – LMU Herbarium, located at the University Eduardo Mondlane – Department of Biological Sciences with approximately 35 000 specimens.

5.3 PERSONNEL

Mr Mario Alberto Calane da Silva
Qualifications: BSc in Biology at Eduardo Mondlane University – Maputo (1981).
Mr da Silva has been working at LMA Herbarium since 1982 (LMA Herbarium Curator) and is the National Co-ordinator of the SABONET Project.

Ms Samira Aly Izidine
Qualifications: BSc Honours in Biology at Eduardo Mondlane University (Maputo, 1995).
She has been working at LMA Herbarium since 1992; Assistant of the National Co-ordinator and as a Trainee.

Ms Marta Manjate
Qualifications: BSc in Biology at Eduardo Mondlane University (Maputo). She has been working at LMA Herbarium since 1991.

Ms Iva Carla Vaz
Medium level Technician. She has been working at the LMA Herbarium since 1991.

Ms Delfina Moiane
Accountant. She has been working at INIA since 1985.

Ms Amelia Ozias Ruco
Secretary. She has been working at LMA Herbarium since 1991.

Elementary technicians

Mr Salomao Macitela – has been at the LMA Herbarium since 1965.

Mr Rogerio Mateus – has been working since 1968.

Ms Angelina Machava – has been working since 1990.

Mr Augusto Alexandre – has been working since 1993.

Mr Abilio Manhique – has been working since 1993.

Mr Sabine Deve – has been working since 1968.

5.4 RESEARCH

The shortage of staff, the lack of funds and the war have prevented botanical expeditions for a long time in Mozambique. However, the herbarium keeps a considerable number of plant specimens (52 000 samples).

Since Mozambique is moving to a stable situation (after the signing of the Peace Accord in October 1992) there is a great need to resume botanical expeditions countrywide to assess the plant conservation status and to evaluate the botanical resources existing in the country and their uses.

Though constrained with the lack of funds, the Department of Botany undertakes a limited number of activities including:

- Herbarium management

- ❖ Studies on indigenous plant use (wild edible plants and medicinal plants)
- ❖ Assessment of the conservation status of plants in Mozambique
- ❖ Distribution of national pasture types in Mozambique (scale 1:4 000 000)

5.5 COLLECTIONS

The LMA Herbarium keeps about 52 000 plant specimens (flowering plants and ferns), most of which were collected before 1975. The growth rate of new specimens accessed annually is about 600. The war, lack of funds and the human resources were the main constraints for this situation.

The main collections are:

Torre, A.R.	18 500
Barbosa, L.A.G.	10 400
Pedro et Pedrogão	9 600
Macedo de Aguiar	5 890
Myre, Mário	5 600
Sousa, A.F. Gomes	5 230
Balsinha, A.	3 107

These collections do not cover all the Mozambican territory due to the colonial war. It means that there is an urgent need to start the inventory of plants of Mozambique for knowing what and how much we have in the territory.

5.6 TRAINING

Priorities are as follows:

- ❖ English course in and outside the country
- ❖ Computer training (PRECIS system)
- ❖ Plant taxonomy (flowering plants and ferns)
- ❖ Herbarium management
- ❖ Plant diversity (research)
- ❖ Checklist and studies of threatened plants in Mozambique
- ❖ Checklist of medicinal plants in Mozambique.

6. OVERVIEW OF THE NATIONAL HERBARIUM OF NAMIBIA (WIND)

Ms Renate Kubirske
National Herbarium, NBRI, Private Bag 13184, Windhoek, Namibia

1990, the year of Namibia's independence, was a turning point for the herbarium as well. The restructuring of the Government Services gave the herbarium the opportunity to change its mode of operation and public image. It now resorts under the Ministry of Agriculture, Water & Rural Development, in the Division of Plant Production of the Directorate of Agricultural Research and Training (Figure 8).

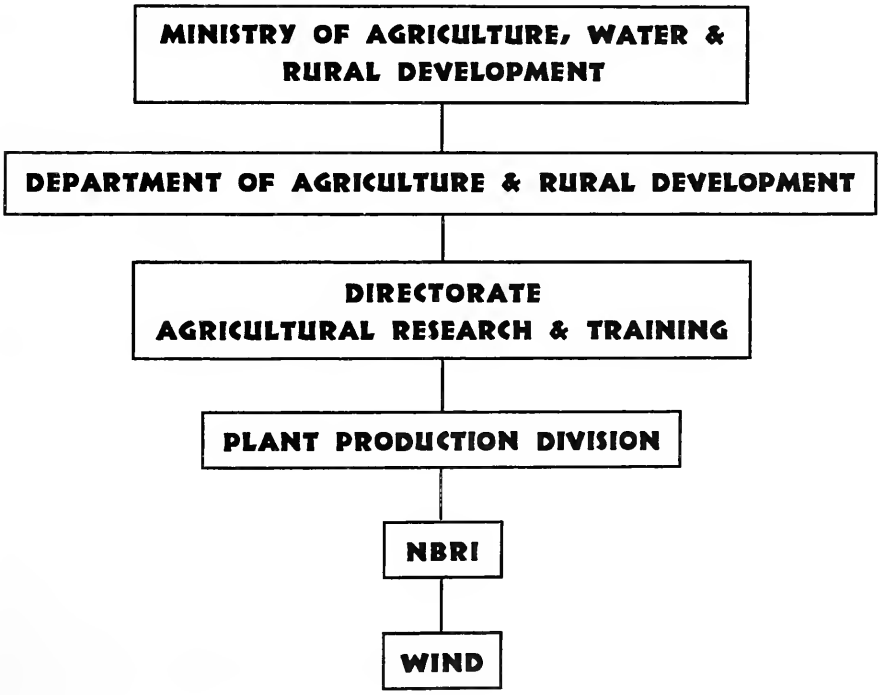


FIGURE 8. Organizational Chart for Namibia's National Herbarium (WIND) in Windhoek.

A new title for the institute was created: National Botanical Research Institute (NBRI) comprising the following subsections:

- National Herbarium of Namibia (WIND)

- National Plant Genetic Resources Centre (NPGRC)
- Vegetation Survey of Namibia
- Botanic Garden of Namibia

In the years prior to independence the herbarium had faced severe problems due to misperceptions on the value of such an institution. As a result the entire herbarium collection had to be stored for a four year period due to lack of facilities and staff. After independence, however, this situation changed. Plans were drawn up for a new building, housing the four subsections of the NBRI.

July 1994. The building process started and occupation took place during May 1996. During this two year period the equipment as well as the collections were packed up and spread out in different locations over Windhoek. The staff members were in different buildings in Windhoek and it was extremely difficult to work effectively as a team.

6.1 NATIONAL PLANT GENETIC RESOURCES CENTRE

Namibia become involved with the regional project to conserve and utilize the indigenous plant resources in the SADC countries. The NPGRC has hosted and attended national as well as international workshops and training programmes. It has also collaborated in regional germplasm collection missions.

Since its practical establishment in 1993, 1 900 accessions comprise the National Genebank Collection to date. The emphasis is on landraces of pearl millet, sorghum, indigenous fruit trees, wild relatives of crops and various wild species thought to be threatened by overutilization or habitat destruction.

6.2 VEGETATION SURVEY OF NAMIBIA

The main aim of the ecological unit of the NBRI is to produce an updated, comprehensive vegetation map of Namibia comparable to Acocks's Veld Type Map of South Africa. The Giess map presently used is at the biome level, and is not suitable for vegetation and grazing management purposes. The initial map will be at the 1:1 000 000 scale, while refinements will be done at the 1:250 000 scale.

6.3 BOTANIC GARDEN OF NAMIBIA

The garden, with an area of 11 ha, adjoins the premises of the NBRI. This land was donated to the Government and subsequently proclaimed a nature reserve under the jurisdiction of the Ministry of Environment and Tourism.

In the 1970's paths were layed out and many *Aloe* spp. were introduced. Currently the garden is being cleaned up, exotic plants eradicated as well as pathways repaired and constructed before the development can take place. An overall plan has been developed with the assistance of various institutions.

6.4 NATIONAL HERBARIUM OF NAMIBIA (WIND)

The South West Africa Herbarium was established in 1953. This coincided with the extension of the Botanical Survey of South Africa to include Namibia (then South West Africa).

The first curator of the South West Africa Herbarium was appointed in 1957; a farmer and keen amateur botanist, Mr Willy Giess. After independence the existing name of South West Africa Herbarium or State Herbarium was officially changed to the National Herbarium of Namibia.

The National collection comprises 64 000 specimens which are kept in two separate halls: The Monocot Hall (included are the Pteridophyte, Gymnosperm, Macrofungi, Lichen and Exotic Collection) and the Dicot Hall.

This is the only significant collection of herbarium specimens in Namibia. Most nature reserves have a few herbarium cupboards and specimens that occur locally. Those collections are seldom, if ever, curated. Nearly all specimens are lodged as duplicates in WIND.

One of the major long-term projects of the National Herbarium is to update and translate the *Prodromus einer Flora von Südwest Afrika.* This taxonomic publication was written by Hans Merxmüller and his students from the University of Munich during the late 1960's. This comprises the *Flora of Namibia* project.

A checklist of the plants in Namibia was produced in 1992, based mainly on the *Prodromus.* It is currently revised and incorporates not only literature but also herbarium specimens. This count brings the number of indigenous plants to 4056, compared to the previously quoted 3 540 taxa.

The list of Namibian endemics is also currently being revised in partial fulfilment of the Biodiversity Convention. This study will highlight not only the number of Namibian species but also "hotspots" of endemism, i.e. target areas for conservation.

As a research institute in a developing country the NBRI can no longer afford to conduct studies which are entirely of academic interest. The projects currently undertaken at this institute have an agriculturally applicable thrust.

Projects currently undertaken by the staff of WIND:

- *Flora of Namibia*: to produce an up-to-date key to the flora of Namibia
- *Genetic Resource and Agricultural Potential of indigenous Cucurbitaceae in Namibia*
- *Poisonous Plants Survey of Namibia*: to determine the extent of infestation of poisonous plants, as well as the identification of problem areas for land rehabilitation, to investigate eradication methods
- *Investigation of Plants with Useful Properties in Namibia*: to be able to provide information on Namibia's medicinal, edible plants and to gather ethnobotanical information
- *Namibian Plant Diversity*: to determine and map the Namibian endemics, as part of the Namibian Biodiversity Country study
- *Problem Plants*: to provide basic information on weeds to agronomists, as well as their eradication
- *Collection, Identification and Compilation of a Preliminary National Checklist of Fungi (Mycota) occurring in Namibia.*

Staff of the National Herbarium are:

1 Principal Researcher: The officer-in-charge and correspondent of the Institute, Ms Gillian L. Maggs
1 Senior Researcher: The biodiversity specialist, Ms Patricia Craven
1 Researcher: Curator of the specimen collection, Ms Renate Kubirske
2 Technicians: Working on lower plants, Mrs Coleen Mannheimer and on problem plants, Ms Esmerialda Klaassen
1 Pupil Technician: Ms Marianne Uiras
1 Technical Assistant: Ms Belinda Polster.

The biggest problem for the herbarium is the lack of staff with formal taxonomic training. Only one staff member has post-graduate training in taxonomy, while the rest are self-trained.

Therefore training requests for WIND are :

- A course on botanical nomenclature
- In-service training on the identification of specific groups by experts. One such course envisaged will be on the family Poaceae by two taxonomists from the National Botanical Institute. Other problem groups will be identified at a later stage
- A course on the prevention and eradication of herbarium pests and diseases and their control
- Database development and management
- Course on propagation of indigenous plants and nursery practices

- ❖ Course on the maintenance of living plant collections in nurseries and botanical gardens
- ❖ Computer literacy and basic DOS courses
- ❖ Botanical illustrations.

The training of horticulturists is included in the herbarium training requests because the Botanical Garden will be a support "tool" for the herbarium.

6.5 CONSTRAINTS AT WIND

The availability of publications to WIND: The library at the NBRI receives many different botanical publications, although not all the relevant taxonomical publications. An exchange of content pages of the publications not received, to be able to get the "missing" articles, is requested from the National Herbarium, South Africa.

Many studies on Namibian plants are undertaken by outsiders. These studies are not coordinated and often duplicated. They are not always of national priority.

Patchiness and variability of rainfall hampers collection of specimens according to specific time schedules.

6.6 COMPUTERIZATION OF WIND

The National Herbarium of Namibia is equipped with a fairly good supply of computers. Nobody has formal computer training, but most of the staff are computer literate.

After consultation and negotiations with Mr Denis Filer of the Oxford Forestry Institute, WIND acquired the BRAHMS (Botanical Research and Herbarium Management System) Programme. Serious computerization started during 1995. The Programme consists of a Rapid Data Entry (RDE) Programme, where specimen label information is added. This is then imported into the main database. Different types of reports can be generated, for example phenology tables, specimen labels and formal publications can be printed from BRAHMS's Report Generator.

Up to date about 4 000 specimen labels have been entered onto the RDE and subsequently BRAHMS programme. This is done concurrently with the rest of the workload of the technicians. The latest development of this programme is the conversion to a Windows base. New versions are received on a regular basis.

Despite severe restrictions on the activities at WIND in the recent past, it is anticipated that the herbarium should soon become fully operational. Projected activities for WIND are as follows:

As the collection was unpacked towards the end of May 1996, the first step will be to organise and alphabetise the species in the folders. All the backlog of determinations have to be incorporated. The second step would be to start to catch up on identifications. After the identification course, this process will most certainly be speeded up.

In the long term it is envisaged that the *Flora of Namibia* project will result in a taxonomic key for the country. Computerization should become a priority as it would facilitate easier and quicker information searches. This is, however, a long term process.

7. SOUTH AFRICA'S NATIONAL HERBARIUM (PRE)

Ms Marinda Koekemoer
National Herbarium Curator, National Botanical Institute, Private Bag X101, Pretoria 0001, South Africa

7.1 INTRODUCTION

- The National Herbarium was founded in 1903.
- In 1972 the collection was moved into the present building in the Pretoria National Botanical Garden.
- Since 1989 the National Herbarium is part of the National Botanical Institute (Figure 9). The NBI includes three herbaria (National, Natal and Compton) and eight botanical gardens (Kirstenbosch, Karoo, Harold Porter, Orange Free State, Witwatersrand, Natal, Pretoria and Lowveld).

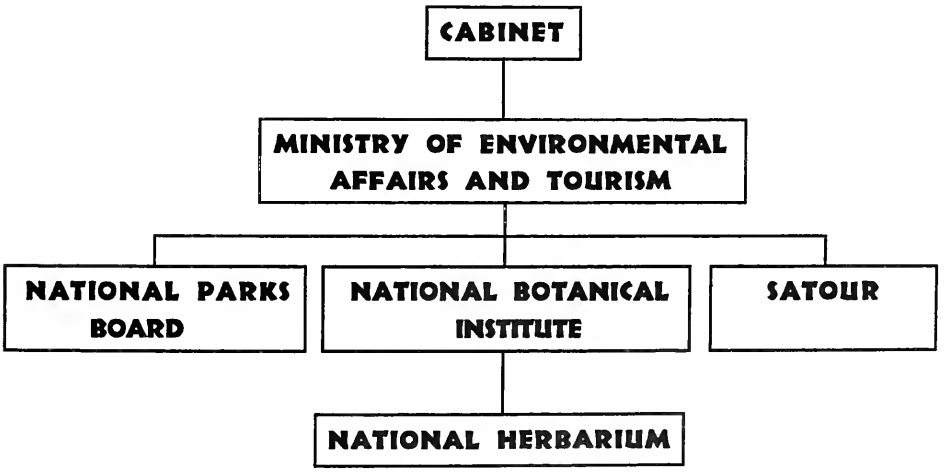


FIGURE 9. Organizational Chart for South Africa's National Herbarium, Pretoria.

7.2 PRESENT STATUS

7.2.1 *Building and Facilities*

The building in which the National Herbarium is housed consists of four floors of which the herbarium occupies three. The main section of the collection is housed on the first and second floor in four wings, one for monocots and three for dicots.

The herbarium staff have access to:

- a small laboratory used mainly for anatomical work
- a photographic lab and photographer
- a scanning electron microscope
- a very good botanical library (Mary Gunn Library)

7.2.2 *Staff and Collections*

Management consists of:

Chief Executive: Prof. B.J. Huntley
Director Research: Dr G.F. Smith
Deputy Director Research: Dr M.M. Wolfson
Curator: Ms M. Koekemoer

Four Assistant Curators: M. Heymann
P. Herman
C. Bredenkamp
G. Germishuizen

There are 36 staff members in the National Herbarium. The staff are divided into four large units, three smaller units and a support staff component. The staff and collections are divided as follows:

- wing A to D
- cultivated plants
- bryophytes
- fossil collection, with two scientists, Drs John & Heidi Anderson focussing on the Molteno formation
- a lichen collection that is currently not curated
- a small spirit collection
- a seed collection.

The support staff include:

- two mounters
- a general assistant and packer
- a label typist
- an identification service co-ordinator
- loans & exchange officer.

7.2.3 *Size*

- The numbers of specimens and taxa in each section at PRE are given in Table 2
- Position in the southern hemisphere (Table 3)
- Position in Africa (Table 4).

7.3 ACTIVITIES

7.3.1 *Services*

- Identifications
- Information (telephone & written)
- Loans & exchanges
- Supplies
- Training

7.3.2 *Research*

- Collaborative projects
- Botanical exploration
- Families & genera of southern African seed plants
- Plant collecting
- Succulent list
- Regional floras

7.3.3 *Individual Research Projects*

- Aquatic macrophytes
- Asteraceae
- Boraginaceae
- Bryophytes
- Cactaceae
- Celastraceae
- Convolvulaceae
- Cyperaceae
- Fabaceae
- Fossils
- Oxalidaceae
- Thymeliaceae

7.3.4 *Curation*

Scan all new literature in library
Evaluate new revisions
Incorporate new revisions and name changes

7.3.5 *PRECIS*

Taxon-PRECIS
Specimen-PRECIS
Curatorial-PRECIS

7.4 CONCLUSION

Like all herbaria worldwide the National Herbarium has to continuously re-evaluate it's situation and adapt to the changing times. It needs to explore ways of funding the activities as well as change to a more service-orientated institution.

TABLE 2. The number of computerized plant taxa and specimens in South Africa's National Herbarium (PRE).

	TAXA	SPECIMENS	SPECIMENS/ TAXON
WING A	8 868	187 582	21
WING B	13 378	156 687	12
WING C	8 182	161 691	20
WING D	11 081	192 577	17
Bryophytes	1 756	31 360	18
Cultivated species*	7 982	21 169	3

Total Number of encoded specimens in PRE: 736 424 (as recorded: 14 February 1997)

*** The cultivated specimens are encoded in DATAEASE and do not form part of PRECIS.**

TABLE 3. The ten largest herbaria in the southern hemisphere (source: *Index Herbariorum,* 1990).

Herbarium	Country	Number of Specimens
Bogor (BO)	Java	1 600 000
Sydney (NSW)	Australia	1 000 000
Melbourne (MEL)	Australia	1 000 000
Pretoria (PRE)	South Africa	900 000
Adelaide (AD)	Australia	700 000
Indooroopilly (BRI)	Australia	523 500
Canberra (CANB)	Australia	500 000
Nairobi (EA)	Kenya	500 000
Rio de Janeiro (R)	Brazil	500 000
Como (PERTH)	Australia	400 000

TABLE 4. The nine largest African herbaria (source: *Index Herbariorum*, 1990).

Herbarium	Country	Number of Specimens
Pretoria (PRE)	South Africa	900 000 (1 000 000)*
Nairobi (EA)	Kenya	500 000
Compton (NBG)	South Africa	430 000**(500 000)*
Bolus (BOL)	South Africa	373 000 (365 000)*
Algiers (AL)	Algeria	350 000
Harare (SRGH)	Zimbabwe	350 000 (500 000)*
Cairo (CAI)	Egypt	300 000
Cairo (CAIM)	Egypt	200 000
Grahamstown (GRA)	South Africa	147 000 (200 000)*

*** Approximate figures in brackets updated February 1997.**

**** The figure of 430 000 includes specimens listed in *Index Herbariorum* for both the Compton Herbarium (NBG)(300 000) and the Stellenbosch Herbarium (STE)(130 000) that were merged in 1996.**

TABLE 5. The National Herbarium in South Africa is one of many herbaria in the country. Other South African regional herbaria that are involved, to a greater or lesser degree, in the documentation and conservation of South African plants are listed (sources: *Index Herbariorum* (1990), Eighth edition, and changes listed in the journal *Taxon* from 1991-1996; *Network of African Herbaria (NOAH)* Number 1 (1994), and the Southern African Herbarium Working Group, SAHWG). Private herbaria have been excluded from the list.

Addo Elephant National Park Herbarium, Port Elizabeth
Andries Vosloo Herbarium, Grahamstown
Augrabies Falls National Park Herbarium, Augrabies
Bews Herbarium (NU), University of Natal, Pietermaritzburg
Bloemfontein Herbarium, Bloemfontein
Bolus Herbarium (BOL), University of Cape Town, Cape Town
Bontebok National Park Herbarium, Swellendam
C.E. Moss Herbarium (J), University of Witwatersrand, Johannesburg
Cape Nature Conservation Herbarium, Jonkershoek
Cape Technikon Herbarium, Cape Town
Cedara Herbarium, Pietermaritzburg
Compton Herbarium (NBG), Cape Town*
De Hoop Nature Reserve Herbarium, Bredasdorp
Dohne Herbarium, Stutterheim
Donald Killick Herbarium (CPF), Pietermaritzburg
Giffen Herbarium (UFH), University of Fort Hare, Alice
Geo. Potts Herbarium (BLFU), University of the Orange Free State, Bloemfontein
Glen Agricultural College Herbarium, Glen
Goegap Nature Reserve Herbarium, Springbok
Grassland Research Herbarium, Pretoria
Goukamma Herbarium, Knysna
H.G.W.J. Schweickerdt Herbarium (PRU), University of Pretoria, Pretoria
Hermanus Herbarium (HER), Hermanus
Johannesburg Botanical Garden Herbarium (JBG)**, Johannesburg
Karoo National Botanical Garden Herbarium, Worcester
Keurbooms River Herbarium, Plettenberg Bay
National Parks Board Herbarium (KNP), Skukuza
Lebowa Herbarium, Marble Hall
Lowveld National Botanical Garden Herbarium, Nelspruit
Lydenburg Herbarium (LYD), Lydenburg
Maputaland Herbarium, Mbazwana
McGregor Museum Herbarium (KMG), Kimberley
Mkuzi Game Reserve Herbarium, Mkuzi
Mountain Zebra National Park Herbarium, Cradock
Natal Herbarium (NH), Durban
National Collection of Fungi Herbarium (PREM), Pretoria
National Museum Herbarium (NMB), Bloemfontein
Oviston Nature Reserve Herbarium, Venterstad
Pasture Research Herbarium, Middelburg
Pasture Science Herbarium, Estcourt
Pietersburg Herbarium, Pietersburg
Potchefstroom University Herbarium (PUC), Potchefstroom

Qwa Qwa Herbarium, University of the North, Phuthaditjhaba
Rand Afrikaans University Herbarium (JRAU), Johannesburg
Robberg Herbarium, Plettenberg Bay
Rolfontein Herbarium, Van der Kloof Dam
Selmar Schonland Herbarium (GRA), Rhodes University, Grahamstown ***
Southern Cape Herbarium, George
St Lucia Herbarium, St Lucia
Suikerbosrand Nature Reserve Herbarium, Heidelberg
Technikon Pretoria Herbarium, Pretoria
Towoomba Research Station Herbarium, Warmbaths
Tsitsikamma National Park Herbarium, Storms River
Umtamvuna Nature Reserve Herbarium, Port Edward
University of Bophuthatswana Herbarium, Mmabatho
University of Natal Herbarium, Durban
University of the North Herbarium (UNIN), Pietersburg
University of Port Elizabeth Herbarium (PEU), Port Elizabeth
University of Stellenbosch Herbarium (STEU), Stellenbosch
University of the Transkei Herbarium (KEI), Umtata
University of Venda Herbarium, Thohoyandou
University of the Western Cape Herbarium (UWC), Bellville
University of Zululand Herbarium (ZULU), Empangeni
Van Stadens Wild Flower Reserve Herbarium, Port Elizabeth
Veld Reserve Herbarium, Worcester
Venda Herbarium (VENDA), Thohoyandou
Vogelgat Nature Reserve Herbarium, Voelklip
Vrolijkheid Herbarium, Robertson
Ward Herbarium (UDW), University of Durban-Westville, Durban
Weeds Herbarium, Uitenhage
Wild Flower Industry Herbarium, Stellenbosch
Williams Herbarium (FFS), University of Stellenbosch, Stellenbosch

* The South African Museum Herbarium (SAM), Cape Town (100,000 specimens) and the Stellenbosch Herbarium (STE), Stellenbosch (160,000 specimens) were merged with the Compton Herbarium (NBG) in 1956 and 1996 respectively. The new Compton Herbarium now has approximately 500,000 sheets.

** The abbreviation JBG has been proposed, but is not yet official

*** The former Albany Museum Herbarium (GRA) and Rhodes University Herbarium (RUH) have amalgamated. The abbreviation RUH has been dropped, and the herbarium is now called the Selmar Schonland Herbarium (GRA) and is located in the Albany Museum, Grahamstown.

NOTE: The Saasveld Forest Research Centre Herbarium (SAAS), George (20,000 specimens) and the South African Forestry Research Institute Herbarium (PRF), Pretoria (22,000 specimens) were transferred to the National Herbarium (PRE) in 1992 and 1993 respectively. The Wicht Herbarium (JF), formerly of the Jonkershoek Forestry Research Centre, Jonkershoek, was incorporated into SAAS before being transferred to PRE. Where SAAS material duplicated specimens in PRE or PRF, it was returned to the Southern Cape Herbarium.

8. THE SWAZILAND NATIONAL HERBARIUM (SDNH)

Mr Gideon Dlamini
National Herbarium Curator, Malkerns Research Station, P.O.Box 4, Malkerns, Swaziland

The Swaziland National Herbarium (SDNH) started around 1955-56 when Prof. R.H. Compton was recruited to do a botanical survey of the country. The herbarium was then based in Mbabane near the police station.

When Prof. Compton left Swaziland in 1976, the National Herbarium was without a Curator and an arrangement was made to transfer his collection to the National Herbarium in Pretoria, South Africa. It was not until a Mrs Ellen Kemp, a Peace Corps Volunteer, came to Swaziland in 1976 that the herbarium collection returned from Pretoria and was housed at the Miller's Mansion in the centre of town in Mbabane.

However, the government found the renting of the Miller's Mansion rather costly and moved the herbarium collection to the Ministry of Agriculture and Co-operative's Headquarters (Figure 10). By then, the present Curator had taken charge of the collection. In 1987 the herbarium moved to the Malkerns Research Station, to a room in the main office block. Four years later it moved to the present building where it temporarily shares space with the Plant Genetic Resources Centre.

8.1 STAFFING

During Compton's days, there was one officer in charge of the herbarium assisted by Mr Ben Dlamini in field work, drying and mounting. This trend continued until 1987 when Mr Ben Dlamini was transferred to the Forestry Nursery.

Miss Sibongile Mabuza (now Mrs Gama) took over the mounting, filing and additional secretarial work. Later Mr Bongani Dlamini was transferred from Forestry Section to the herbarium. He is currently doing a diploma in Forestry in Zimbabwe, to return home in November 1996.

Mr Titus Dlamini joined the herbarium in 1995 and is now doing BSc Honours in Botany at the University of Cape Town to continue with a Master's programme thereafter.

The post of Ethnobotanist has been requested and we are waiting for approval.

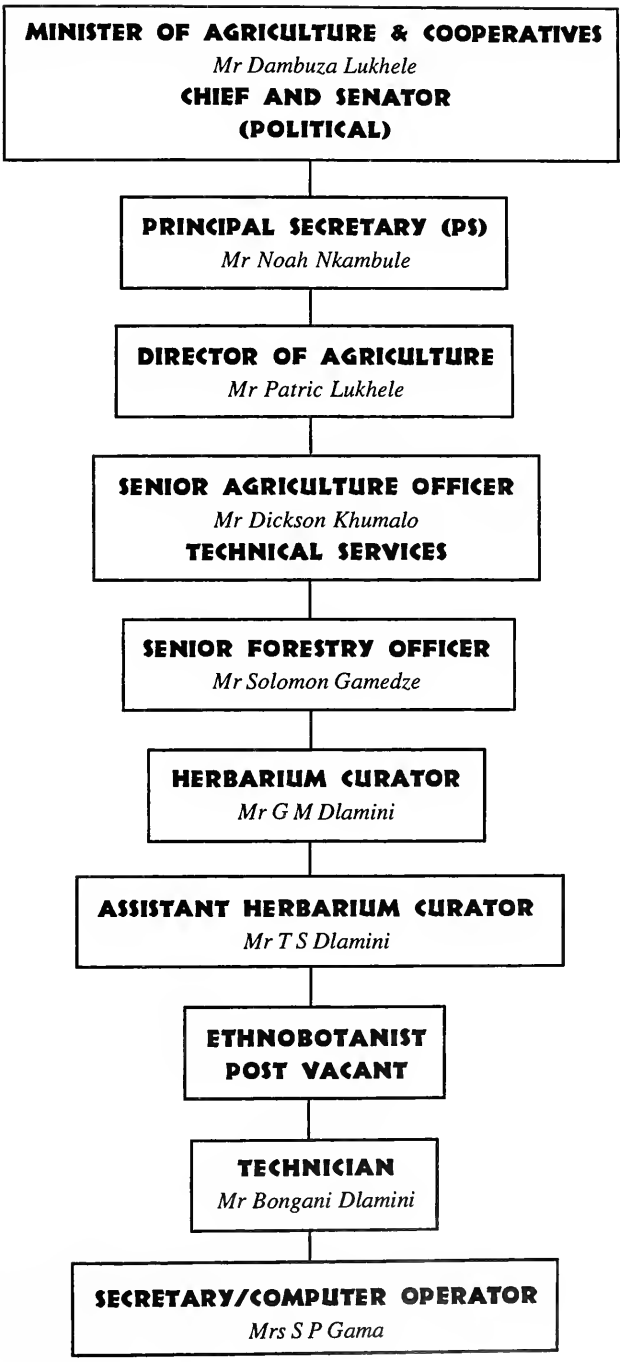


FIGURE 10. Organizational Chart for the National Herbarium of Swaziland, Malkerns Research Station.

8.2 THE COLLECTION

The collection consists of 7 200 plant specimens of mainly ferns and higher plants, distributed in 3 000 species. A few lower plants have however been collected. Two other herbarium collections are kept by the Nature reserves at Malolotja and Mlawula under the Swaziland National Trust Commission, a parastatal organisation. The collection in the National Herbarium and the Trust Commission herbaria are as follows:

	Families	**Genera**	**Species**
Bryophyta	44	80	133
Pteridophyta	22	43	92
Gymnospermae	4	4	11
Monocotyledonae	33	235	853
Dicotyledonae	129	732	2 149
TOTAL	232	1 092	3 238

8.3 STATUS OF COLLECTION

The country has been fairly well collected but preference has been for Mbabane, Manzini, Hlathikhulu and the Reserves (Malolotja and Mlawula). There is a lot to be learnt from previously inaccessible areas, remote areas from towns and Title Deed Farms. In particular, the Lufafa Mountains in the North, the Lebombo mountains in the East, the Grand Valley in the South Central and Mahlangatja area in the West need attention.

8.4 NEEDED SUPPLEMENTS IN THE HERBARIUM

1. A permanent locality and building for the National Herbarium;
2. An assured continuity of staff in the National Herbarium;
3. Herbarium cupboards to be improved;
4. Establishment of a National Botanical Garden;
5. Awareness campaign for the herbarium and biodiversity to politicians, all levels of our formal education and the public in general;
6. The need to improve the sourcing of literature.

9. THE CURRENT STATE OF HERBARIA ACTIVITIES IN ZAMBIA

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9.1 INTRODUCTION

The Republic of Zambia covers an area of 752,610 square kilometres. The greater part of the territory lies on the Central African plateau which is mainly covered by miombo woodlands dominated by species of *Brachystegia, Isoberlinia* and *Julbernadia*. The Western Province and some parts of the Southern and North-Western Provinces lie on the Kalahari Basin which is covered by Kalahari woodlands adapted to deep sands. The plateau is interrupted by the Rift Valley systems of the Luangwa and Lower Zambezi that are covered by mopane woodland in which *Colophospermum mopane* is a dominant taxon. Evergreen forest relicts, montane forests and grasslands are confined to the high rainfall northern sector of the country.

The large diversity of vegetation types in the country are strongly correlated with a corresponding variety of topographic features, geological formations and soil types. Biodiversity embraces a total variety of living organisms, such as the animals, plants, fungi and other microbes. The concept may cover variability at species level, intraspecific level and molecular level. The aim of this paper is to highlight the role of the herbaria and the associated problems in plant systematics of this country.

9.2 NATIONAL BIOLOGICAL PROGRAMMES

In 1967, the University of Zambia Senate had the foresight of establishing a multi-disciplinary research unit called the Kafue Basin Research Project (KBRP) which was mandated to monitor the impact of the Kafue Hydroelectric Scheme within the Kafue River catchment area, including the human settlements and the welfare of wildlife. By the mid-1980s the project extended its activities to other major river basins and thus got renamed as River Basins Research Project, but unfortunately its demise followed the departure of the key expatriate staff who never incorporated local staff to ensure sustainable management of this ecologically oriented programme. Another parallel development in 1967 was the establishment of the National Council for Scientific Research (NCSR) charged with the task of coordinating all the research activities in the country. This statutory body carried out very minor botanical activity through its Trees Improvement and Tissue Culture Unit based on the Copperbelt Province. Systematic services to the NCSR have been offered by the University herbarium. Neither the KBRP nor the NCSR have mounted vegetation surveys or plant ecological programmes.

Reconnaissance vegetation surveys and ecology of some woodland taxa and grasslands were a prominent feature of the government departments of Agriculture, Forestry and National Parks and Wildlife Services during the colonial era and the early part of the post-independence era. The resultant data has been reported in the form of preliminary species lists and occasional papers (Lawton 1964; Fanshawe 1971). At the University of Zambia, members of staff of the Biology Department undertook country-wide comprehensive surveys of the pteridophytes (Kornas 1979) and the mosses (Phiri & Ochyra 1988).

Recently life has been injected in biological programmes related to the development of natural resources through the establishment of the NORAD-funded Luangwa Integrated Resources Development Project (LIRDP) in central Luangwa valley, the WWF-funded Wetland Project on the Bangweulu Swamps and Kafue flats as well as the NORDIC-funded SADC Regional Plant Genetic Resources Centre and its associated National Gene Banks. Projects on wetlands and the Luangwa Valley have tended to focus on management and conservation biology of the vertebrates and the sustainable utilization by local human populations. The Zambia National Plant Genetic Resources Centre (Gene Bank) has centred its activities on *ex-situ* conservation of the germplasm and their wild relatives. This is an aspect of applied botany that should be supported by services of a reference herbarium that has so far not been included for funding by the NORDIC countries.

9.3 DEVELOPMENT OF HERBARIA

Earlier accounts of botanical collections in Zambia can be attributed to R. Bourne of the Imperial Forestry Institute who was seconded to Northern Rhodesia in 1927 and followed by Dr Joseph Burtt Davy who also made extensive collections of woody taxa in 1929 (White 1962). In 1952, Frank White and Andrew Angus of the Oxford University Forest Department made large collections of woody vascular plants which were deposited in Oxford Herbarium (FHO). Their collection culminated in the publication of the *Forest Flora of the Northern Rhodesia*. In 1953, the Northern Rhodesia Forest Department had the blessing of engaging the services of the dynamic Dennis Basil Fanshawe to the post of Principal Scientific Forest Officer. Fanshawe was instrumental in developing the Forest Herbarium (NDO) currently based in Kitwe. After his retirement, the herbarium which holds about 40,000 specimens was later curated by Silvester M. Chisumpa who was also responsible for maintaining Trapnell's Fire Plots in Ndola. Chisumpa's departure from the department gave rise to an apparent neglect to this important collection in the 1990s.

Colin Graham Trapnell laid the foundation of plant ecology in Zambia. He undertook ecological surveys of the country and laid down long-term fire plots in miombo woodlands near Ndola. These experimental plots have elucidated the present understanding of the ecology of miombo woodlands. The return of Mr Andrew Angus to Northern Rhodesia in his capacity as Plant Pathologist at Mount Makulu Central Agricultural Research Station consolidated Trapnell's contribution. The growth of the Mount Makulu Herbarium (MRCS)

with about 20,000 specimens is credited to Andrew Angus who was assisted by Mr Peter Simwanda. The herbarium was later managed by the Pasture Research Unit and Ecology section respectively. After almost a decade of neglect, concern for the curation of the herbarium was revived with it's use as a reference centre for the newly established National Gene Bank.

The International Red Locust Control Service (IRLCS), whose headquarters was located in Mbala, employed L.D.E.F. Vesey-Fitzgerald as resident botanist. He made several collections with the assistance of Mr Wilfred Siame. Vesey-Fitzgerald published excellent accounts on grasslands of Central Africa and established a reference herbarium for this entomological organization. Another notable contributor to this herbarium was Mrs H. Mary Richards who recorded several new species in the Mbala District.

The University of Zambia herbarium (UZL) was established in 1967 by Professor Dewan Mohinder Nath Nair with a core of specimens collected within a 50-mile radius around Lusaka. The collection was boosted by replicate specimens donated by the Forest Herbarium (NDO), the Mount Makulu Herbarium (MRCS), the Lusaka Natural History Club and institutions in India and New Zealand. P.S.M. Phiri took over the curation of the herbarium after the untimely death of Professor Nair in 1971. In the mid-1970s the IRLCS offered about 10,000 herbarium specimens to the University of Zambia. The herbarium has about 25,000 specimens of vascular plants and bryophytes.

When William L. Astle retired from the Department of National Parks and Wildlife Services to join the F.A.O. in Botswana in 1970, he left a considerable number of herbarium specimens at Chinzombo Wildlife Research Station in the Luangwa Valley. At the request of the Directorate of the Luangwa Integrated Resource Development Project, P.S.M. Phiri re-organized the Chinzombo Herbarium in January 1995. This herbarium currently holds 3,640 authentically named specimens most of which are taxa of low altitude rift valley systems.

The country has a total of four herbaria of which two are located in the Lusaka Province, one in the Copperbelt Province and another in the Eastern Province. The University of Zambia Herbarium (UZL) which provides identification services to research institutions and postgraduate students in the country is the most active botanical centre. The herbarium also provides teaching facilities to undergraduate students and short-term regional workshops in Plant Genetic Resources programmes.

9.4 CLASSIFICATION SYSTEMS

The classification systems employed in governmental herbaria is alphabetical. For practical purposes the alphabetical system has been used at familial level. However, at Chinzombo Wildlife Research Station, the pteridophyte families precede the angiosperms. The familial taxa at the University Herbarium which serves the roles of teaching and research have been

arranged according to a phylogenetic system devised by George Ledyard Stebbins. Pteridophyte families have been arranged using R.E. Pichi-Sermolli's system, whereas the bryophytes - particularly mosses, have been arranged according to A.J.E. Smith's system employed in his textbook, *Moss Flora of Britain and Ireland.* The genera under Poaceae have been classified using the Clayton-Renvoise numbering system which places specimens of related genera in close proximity. The genera and species in each of the other families are alphabetically arranged.

9.5 PROPOSAL FOR NATIONAL HERBARIUM

The first proposal to establish a National Herbarium in Zambia was made by Professor Olov Hedberg of Uppsala University at the National Workshop on Plant Genetic Resources held in Siavonga in 1990. As a SADC consultant, he recommended the transformation of the University Herbarium (UZL) into a National Herbarium. The proposal was accepted by the workshop in its resolutions. However, the NORDIC countries did not accept the idea of a twin development of both the National Gene Banks and National Herbaria. Instead they opted to restrict funding towards the development of national gene banks and one SADC Regional Gene Bank in southern Africa.

The basis for Kew's recent incentives to set up a National Herbarium in Zambia remains unclear. Herbaria in Zambia have been in existence for more than four decades to date. The decline in government funding for botanical research and biological programmes has been apparent for the last twenty five years. Certainly the establishment of a National Herbarium will require proclamation by an Act of Parliament to create a special budgetary vote as has been the case for the current two national universities.

It is thus anyone's guess how the ***Structural Adjustment Programme*** would accommodate this proposition in the light of the number of governmental departments that are being transformed into Management Boards and National Authorities, with some being swept into oblivion. Zambia will have to victoriously rise above financial constraints due to world-wide economic decline to be able to promote and adequately fund a National Herbarium. Long-term sustenance of such an institution cannot perpetually rely on foreign donations. Yet there must be an active herbarium manned by trained personnel to spear-head botanical research and produce literature of value in the development of applied areas of agriculture, forestry, horticulture, medicine, wildlife management, pollution monitoring and other aspects of applied ecology.

9.6 PREDICAMENT AND PROSPECTS OF HERBARIA

The dwindling of botanical research in government departments during the post-independence era has contributed to a corresponding slump in the funding of herbaria. Nevertheless, initiatives for new megadevelopments in the form of the Batoka Hydroelectric

Scheme, recent concern of pollution in the environment, problems of aquatic weeds on major rivers and the degradation of woodlands and forests, all contribute a host of national problems whose solutions lie in the understanding of the biology of keystone plant species. For instance, the country has not appreciated the role of plants as indicators of geological formations and soil types. Some species are good indicators of pollution as evidenced by the near-absence of foliose lichens in woodlands located to the west of Luanshya mine residential area due to toxic gases emitted by *Zambia Consolidated Copper Mines* (ZCCM) smelting plant. Furthermore, the occurrence of aquatic weeds cannot be explained plausibly for lack of data on the aquatic flora in the Kafue Basin.

Preliminary checklists have been reported that form a good basis for execution of a comprehensive inventory of plants in the country (White 1962; Astle, Webster & Lawrence 1969; Phiri & Ochyra 1988; Phiri 1996). However, the floristic knowledge in vast areas of the territory remains unknown. With regards to the Luangwa Valley, only about 50-75% of the flora has been documented. Hence the need for further botanical explorations.

There is a greater need to maintain the existing herbaria in the country. The development of a National Plant Genetic Resources Centre (Gene Bank) calls for strengthening of the Mount Makulu Agricultural Research Herbarium (MCSR) into a good reference herbarium to deal with the taxonomy of crop plants and their wild relatives, including under-utilized wild fruit and vegetable plants. The government plan to transform the Department of Forestry into a Zambia Forestry Authority should prompt the newly formed School of Forestry Science to take over the running of the Forestry Herbarium (NDO) to enhance teaching and research at the Copperbelt University in Kitwe. The herbarium at Chinzombo Wildlife Research Station should function as a reference centre in the management of the four National Parks and adjacent Game Management Areas. The University of Zambia Herbarium (UZL) obtains its limited financial resources from the overall budget allocated to the Department of Biological Sciences. The department caters for teaching in the main disciplines of botany, ecology, genetics, microbiology, pathology and zoology. The herbarium is a valuable asset in the provision of teaching and research facilities to the Schools (Faculties) of Natural Sciences, Agriculture, Medicine and Veterinary Medicine. The herbarium also extends its identification services to researchers in government institutions and overseas postgraduate students. Unfortunately drastic cuts of technical staff has affected the execution of departmental biological research programmes in general and herbarium management in particular.

The launching of the SABONET project in the southern African region will rejuvenate botanical activities in Zambia. The University of Zambia will play a pivotal role in bolstering the field of plant systematics. Given the requisite incentives and encouragement, the University can display its full capacity to contribute to this new regional programme. This can be achieved by supporting the University herbarium in the acquisition of field and analytical equipment, such as: a GPS for determining the geographic position of plant

localities; an altimeter for determining elevation; field compasses for laying out plots and transects; a 4-wheel drive vehicle to cover country-wide explorations; dissecting and transmission research microscopes fitted with camera Iuncida/Photomicrograph equipment for micromorphological and anatomical studies; a large deep freezer for pest control; mounting materials for specimens; preservatives; a computer for database documentation and GIS mapping programmes; and a photocopier to replicate botanical information for distribution to the relevant users in the country and the SADC region.

Whereas the University herbaria elsewhere have been primarily used for teaching and postgraduate research in which ecological collections form a prominent feature, the University of Zambia Herbarium can as well curate collections useful in the preparation of the country's floras, checklists and develop databases of value in effecting conservation strategies in the country. Therefore, commitment to the real needs of the country should be the cornerstone influencing the thinking, pronouncements and actions of botanists genuinely concerned in promoting the programme of botanical inventory and capacity building in the SADC region.

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10. THE NATIONAL HERBARIUM OF ZIMBABWE (SRGH)

Ms Nozipo Nobanda
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10.1 WHAT IS IT?

A multipurpose resource centre for botanical research and information of Zimbabwean plants and plant communities. It is the leading agency in the following:

- ❖ Plant names, identification and distribution
- ❖ Identification of rare & threatened plants and plant communities
- ❖ Vegetation surveys and mapping
- ❖ Plant taxonomy
- ❖ Ethnobotany.

Main objective: The conservation, enhancement and curation of the country's principal plant collections for national and international reference and study.

Other objectives:

- To promote scientific research and documentation on the plants of Zimbabwe.
- To provide plant-related services to local and international communities.
- To improve community awareness, appreciation and understanding about the importance of plants and plant communities for sustainable development.

10.2 COLLECTIONS

Herbarium:

- estimated at 500 000 plant specimens
- 2 100 types
- 307 families; 237 Zimbabwean
- 3 641 genera; 1 712 Zimbabwean
- 21 205 species; 5 813 Zimbabwean

Botanical Garden:

- about 68 hectares in extent
- has a collection of about 1 500 species
- 800 Zimbabwean trees and shrubs arranged into sections

- ❖ Rainforest
- ❖ Miombo Highveld
- ❖ Lowveld Savanna
- ❖ Riverines
- ❖ Natural Woodland

– **Other sections**

- ❖ Non-Zimbabwean Sections: Mozambique, Zambia, Angola, South Africa, South America, Australia, Asia
- ❖ Systematic Sections: *Ficus*, Combretaceae, *Acacia*
- ❖ Economic Sections: Fruit Trees, Herb Garden

Desert House: about 200 plant taxa from mainly Namibia and South Africa.

NATIONAL HERBARIUM AND BOTANICAL GARDEN (Figure 12)

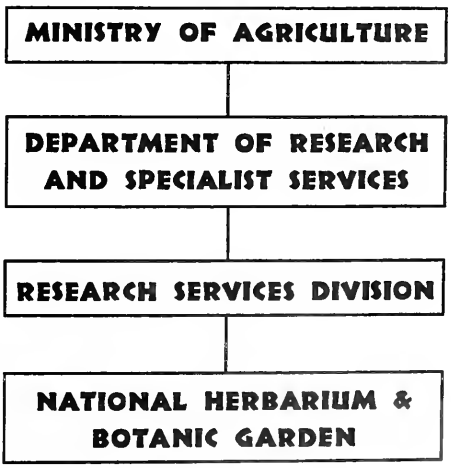

FIGURE 12. Organizational Chart for the National Herbarium and Botanic Garden of Zimbabwe, Harare.

10.3 STAFF LIST

No. of Posts	Title	Incumbent
1	Head of Institute	Nozipo Nobanda
5	Research Officer	Soul Shava Alfred Maroyi Claid Mujaju (2 frozen vacancies)
1	Assistant Curator	Tawanda Ganda (G)
3	Research Technician	Stephen Mavi Esther Makombe (G) (1 frozen vacancy)
2	Technical Assistant	Anthony Mapaura Allen Micho (G)
2	Typist/Stenographer	Beatrice Kaunda (1 frozen vacancy)
3	Laboratory Assistant	Billie Evans Maxwell Mahlunge Joshua Mukoyi
38	Support Staff	32 filled (G) (6 frozen vacancies)

10.4 PROBLEMS

10.4.1 *Research*

- very little taxonomic research
- University of Zimbabwe weak in systematic botany to support herbarium officers
- former taxonomists in the herbarium not good at grooming
- present collaboration not effective in capacity building
- contributors to *Flora Zambesiaca* working independently of SRGH
- no exchange programs for officers

- ❖ visiting researchers are collaborating with former employees rather than the present establishment
- ❖ establishment too small
- ❖ officers overstretched with services like processing loans, plant identification and guided walks
- ❖ financial constraints: the budget is shrinking every year.

10.4.2 *Botanic Gardens Management*

- ❖ vandalism
- ❖ armillaria
- ❖ water shortage

APPENDIX 1: LIST OF WORKSHOP PARTICIPANTS

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